

A hand holding a computer keyboard against a sunset background.

# POPULAR Computing WEEKLY

9 September 1982 Vol 1 No 21

**35<sub>p</sub>**

**Exclusive**  
**We take the lid off**  
**the Jupiter Ace**

**Play Simon on your BBC**

**Spectrum stock control**

**Vic relocation**

**Cover Story:**  
**Pteragon on BBC**

**Whizzkid '82**  
Win a Dragon 32 & £2000  
of advertising



# POPULAR Computing WEEKLY

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### Subscriptions

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### How to submit articles

Articles which are submitted for publication should not be more than 1000 words long.

All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

### Accuracy

*Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

## This Week



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## Editorial

The *Jupiter Ace*, launched last month, is a new kind of low cost micro. Designed by Richard Altwasser and Steve Vickers, the team responsible for Sinclair's ZX Spectrum, the *Jupiter Ace* consists of a Z80A micro-processor complete with 8K Rom, 3K Ram and 32 x 24 display.

But, while the hardware is fairly standard, the software is decidedly different. The *Jupiter Ace* is the first micro to use Forth. Almost every other micro on the market uses some form of Basic.

Forth was invented by Charles Moore and Elizabeth Rather at the US National Radio Astronomy Observatory in the early 1970s. It is much faster than Basic and takes up far less memory. Supporters of Forth also claim it is easier to learn than Basic.

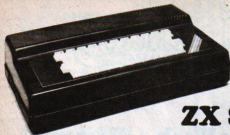
Calculator enthusiasts, who should be familiar with Reverse Polish Notation, will find little difficulty in coming to grips with the *Jupiter Ace*. Micro users, who have already learnt to program in Basic, may find it harder to deal with Forth.

Whatever your views on Forth, Altwasser and Vickers should be congratulated for trying something new. I just wish the *Jupiter Ace* was colour instead of black and white.

## Next Week



Can you save your city from the mutant bees?  
Find out in *Swarm*, a new game for Spectrum.



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Makes an ideal Christmas present to expand the new low priced Sinclair ZX81. Or why not buy a new ZX81 based system directly from us, consisting of ZX81, FD42 keyboard and case with power supply and reset switch, leads and manual £69.95 + £2.50 p & p

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## Christmas launch for Commodore Max

THE new Commodore Max is to be launched in the UK just before Christmas.

Features will include a 66-key keyboard, complete with four programmable function keys, direct audio and video output and a built-in RF modulator. Twin control ports will allow the use of two joysticks, four paddles or a lightpen.

There is a cartridge slot for games. The Max cartridges will be compatible with the Commodore 64 (reviewed in *Popular Computing Weekly*, September 2).

A mini Basic cartridge option will enable users to write their own programs.

The Commodore Max (formerly called the Vic10 and the Ultimix) has 2K internal memory and a 40 column x 25



Commodore Max.

line display. There are 16 colours, which can be used simultaneously on-screen. Graphics resolution is 320 x 200 pixels.

The Max's sound consists of three independent voices of nine octaves each. There is an envelope generator, a programmable filter and master resonance and volume controls.

The Commodore Max will have a recommended retail price of £110 including VAT.

## Panasonic to launch handheld computer in UK

PANASONIC is to launch the RL-H1000 hand held computer in the UK next spring.

The primary unit of the system is based around a 6502 processor with 16K Rom and either 4K or 8K Ram. It also features a built-in 26 character liquid crystal display.

The main advantage of the microcomputer is its size. The primary unit is 9in x 2½in x 3¼in and weighs just over 1½lb.

It is powered by five nickel-cadmium rechargeable batteries.

Mains operation is also possible using an AC adaptor.

The range of peripherals that will be available with the machine includes I/O adaptor, RS232C interface, acoustic modem, tv adaptor and a programmable memory expansion protected by its own back-up battery.

All of these accessories, together with the primary unit, can be fitted inside a specially converted attache case.

The RL-H1000 hand held computer has been on sale in the US since January this year. Current American prices for the primary unit are £225 and £280 for the 4K and 8K versions with peripherals costing between £60 and £200.



Panasonic's handheld micro.

## Prestel to give away free adaptors

PRESTEL hopes to give away 100,000 free adaptors, to encourage more home tv owners to use its services. The scheme, which is known as Project Y, will be carried out in collaboration with an unnamed financial institution.

The Prestel adaptors will be offered to the institution's existing customers as part of a package deal.

## The age of the game

IT is now possible to annihilate space invaders between London and Scotland.

In an experiment being conducted by British Rail, selected trains from Euston to Inverness will carry a Space Invaders machine along with the sandwiches in the buffet car.

The machines have been supplied by Bell Fruit (UK) Ltd and have been installed with the help of area maintenance staff at British Rail's Derby engineering works.

Introduction of the machines was the idea of Peter Dunkerley, a member of BR's Transport Technology Assessment Group. He says "We investigate all kinds of new

technology which may be adapted to increase BR's passenger and freight revenue. The Space Invaders project started following a brainstorming session."

If the scheme is successful the idea may be extended to other long-distance services.



Aliens from Inverness.

## Speculation over IBM's Greenock plant

THERE is increasing speculation that IBM's Personal Computer will be produced at its Greenock plant in Scotland.

The IBM Personal Computer, which costs £888, was launched in the US in August 1981. It has yet to be released in the UK, though a limited number of machines have been imported by companies such as KGB Micros.

However, an IBM spokesman said "There has been considerable speculation over many months about the possibility of an announcement of the IBM Personal Computer in Europe, including its place of manufacture."

"We have consistently refused to comment on such speculation and continue to do so."



IBM's Personal Computer launched in the US.

## Lynx micro from Computers

THE Lynx, a new micro from Cambridge-based Computers Ltd, will be shown publicly for the first time at the *Personal Computer World* show in September.

The new micro will cost £150 plus VAT. It includes 48K Ram, an integral power supply and a typewriter-style keyboard. Other features in-

clude high resolution colour graphics and a built-in speaker.

A complete Lynx system, with disc drives and printer, will be on display at the Lynx stand — No 269 — from September 9-12.

More information from Computers Ltd, 36a Hills Road, Cambridge CB2 1LA.

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**Computing**  
WEEKLY

## Discount Club



### \* 4 Spectrum tapes

Popular Computing Weekly has negotiated a special discount offer on the latest Spectrum tapes from Richard Shepherd Software.

### \* Save £1.20 on Ship of the Line

Our price £5.30 (List price £6.50) for the 48K version  
Our price £3.95 (List price £4.95) for the 16K version

In the massive 48K version of this popular adventure game you have to use your skill and cunning to be promoted from a Midshipman in the Queen's Navy, to First Sea Lord. Can you lead a boarding party? Can you aim your guns? Can you bribe the selection panel when you fail the intelligence test?

### \* Save £1.00 on Fruit Machine and Submarine

Our price £3.95 (List price £4.95)  
This double cassette runs on either the 16K or 48K Spectrum. The main program, **Fruit Machine**, shows the moving reels in realistic high resolution colour graphics. If you are addicted to fruit machines save your money by playing this game on the Spectrum. Includes nudge and hold.

### \* Save £1.50 on Cash Control

Our price £8.50 (List price £10.00)  
This is a comprehensive 48K cash control program. It covers everything from calculating your mortgage to controlling your bank balance and everyday expenditure. It is well cross-referenced and easy to use.

### \* Save £0.70 on Monster Mine

Our price £4.25 (List price £4.95)  
This high quality game for the 16K or 48K Spectrum is written in machine code and is fast. You have to manoeuvre and climb out of a mine-shaft picking up nuggets of gold on the way. All the time you have to move fast to avoid being eaten by the monsters chasing you.

To have these top cassettes sent to your home all you have to do is fill in the form below and send it to Popular Computing Weekly.

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	Ship of the Line 16K	£3.95
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	Cash Control	£8.50
	Monster Mine	£4.25
		Total £

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# Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

## Riding the gravity train

I enjoyed Jeremy Ruston's "Voyager" program in the July 22 issue, but the message "You missed — see you in 30 light years" is bad enough to be a quote from Star Wars. As anyone who has ever picked up a physics text book (or watched Star Trek for that matter) could tell you, a light year is a measurement of distance.

Also, why our frozen food should go off because we went fast is beyond me. Might I suggest that the fuel ran out first.

I also enjoyed Reverse by Mike Berry. I hope you can continue the standard.

Peter Greenall  
Leicester

## Or hitching with the dragon?

It surprised me after reading your review of the Dragon 32 and associated comments and letters from your readers, that no one has spotted one essential fact. The Dragon is not only in direct competition with the Tandy Colour Computer, it also consists of exactly the same technology, with very few exceptions.

The 16K extended Micro-soft Basic, with its special commands for 256x192 graphics and one channel sound, is to the byte the same as used on the pre-existing Tandy. The low quality screen display and Rom port are also reminders of that machine.

I owned a Colour Computer for some eleven months and found it to be under-supported and of low quality components ie clickity-clackity keyboard and no parallel port. When I moved here from the US, I sold it at a loss and chose what to me seemed to be a high quality machine with future options for expansion — the BBC model B. Now I see that the ghost of my former computer, albeit with a fairly good keyboard and Centronics port, has followed me over the Atlantic.

PS if the Rom port is the same as the Tandy, and I see no reason why it would not be, then Dragon owners will find there is a ready bank of software at their nearest Tandy dealer.

William Barnes  
5 Shaftesbury Villas  
Allen Street  
London W8

## Spectrum bugs wanted

Paul Harrison in this column (August 12) reported a 'bug' in his Spectrum — well, all of the presently available machines have it and more!

Paul noticed that if the 'cursor-line' was set to 'one after' the last key of a program then the edit key gave an edit-line containing a 'cursor'. His example was to enter:  
100 PRINT — ENTER  
101 — ENTER  
EDIT

and line 100 would be brought down with the 'cursor' (but not when using 255 and 256). So what is happening?

In the above case, the 'cursor-line' is 100 when the first Enter is keyed. It becomes 101 when the second Enter is keyed but when Edit is used there is no line 101 and the last line of the program, ie 100, is called down.

Now for the problem. The programmer of the Rom decided that Edit lines shall not have a 'cursor'. He says that before printing an Edit line the system variable E-PPC, that holds the cursor line number, will be decremented — but he forgot that the last line of the program might have a line number that is 'E-PPC — 1'. Hence on those special occasions a 'cursor' is printed.

The solution is probably quite simple — change the instruction line at OFDE h from Call 1855 to Call 1860.

And for two further bugs. Try replying to 'scroll?' with 'caps lock', 'graphics', or 'shift & symbol shift'. The results are interesting and it is most surprising that the Spectrum does not crash.

The other bug is to ponder over why 'Int = 65536 = -1'. No doubt other 'bugs' will

appear and I would very much like to hear about them.

Ian Logan  
24 Nurses Lane  
Skellingthorpe  
Lincoln LN6 5TT

## Time gentlemen — please

My Spectrum has been on order from Sinclair for eight weeks now. Having contacted them recently, I am informed that rumours of the backlog being eliminated are "greatly exaggerated". How much longer must I wait, I wonder.

When my Spectrum does arrive, however, I would like to know what amendments I will need to make to the numerous programs I have collected for the ZX81 so that they will run on the Spectrum. I have not seen this aspect of upgrading mentioned or dealt with in any magazine. Can you help?

B Davies  
2 Juniper Crescent  
Apsley Park  
Longthorpe  
Peterborough PE3 6QY

Most ZX81 Basic programs will run on the Spectrum with little or no modification. But, you will have to add your own commands to take advantage of the Spectrum's colour and sound facilities.

The simplest solution may be to use East London Robotics' Slowloader, which allows ZX81 software to run on the Spectrum. It costs about £10 and is available from East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London E6.

## Cut-outs— the moaning

I am writing to make some constructive criticism, not just to complain.

I have found myself in agreement with your editorials and they have provided inspiration on many occasions. However, your editorial of July 29 exasperated me.

Motivated by a previous editorial extolling the virtues of machine code, I attempted

to develop my limited skills by writing a machine code program of my own. But, before I could send it off in all its glory for your hoped for approval, I read "Moonlander, Space Invader and Fruit Machine programs abound". My program was a version of Fruit Machine. Oh Well!

Having my work accepted is a great boost to my enthusiasm. Please encourage us, but be tolerant when we use an "oldie" idea to try and improve our skills. Soon, I hope, both my skills and my ideas will be increased.

Second moan. Could you print cut-out forms and competition entries on the back of advertising pages. I do not want to enter the "Spectrum" competition as it would mean losing large sections of articles that I wish to keep for future reference. Likewise your Reader Survey.

When you began, you ran competitions on a theme. Could you not repeat this, perhaps on a monthly basis? Then you could print two or three of the best entries in future issues. This would give us some motivation, even if the only "prize" was possible publication.

Ray Elder  
1 Periton Court  
Parkhouse Road  
Minehead  
Somerset

We do try and print cut-out forms on the back of advertising pages, but the exigencies of production are such that it is not always possible. As for theme competitions, please write in and let us know your views.

## On-screen images

After typing in the short Amachine code routine in the Instant screen article in July 1, I noticed that changing 3E in byte 16526 to C6 produced an inverse image of the screen. All the information in table 1 still applies to the routine.

Patrick Budden  
Wolfferton  
Dorchester DT2 9QN

# COVER STORY

## Pteragon

A new game for BBC  
micro by A Snell

The sudden insistent beep of the search radar alarm breaks the silence in the cockpit of the solar-powered skimmer. As a newcomer to the Planetary Defence Force, you tense to full alertness — this is your first mission.

The recently established colony on the planet Beta Strigidae has been under attack from huge winged reptiles — the semi-sentient Pteragon. Your task is to destroy the incoming waves of monsters before they reach the settlements. Each member of the PDF must deal with five of the creatures in each attack, and there is intense competition within the force to shoot them down in as short a time as possible.

The sound of powerful wingbeats can be heard as the first of the Pteragon comes into view through your craft's forward ports, you must manoeuvre quickly to frame the monster in your sights before it flies past. The 'A' and 'Z' keys move the skimmer up and down, and the '>' and '<' keys move you right and left. The space bar fires your energy beam weapon, and if you are a good shot will vaporise the Pteragon.

If the Pteragon moves out of your field of view for too long, you will lose it and incur a time penalty. The score shown on your display is the time taken to shoot down the number of Pteragon shown in the HITS column, plus any time penalties for missed monsters. RECORD gives the fastest time achieved so far — the time that you must beat.

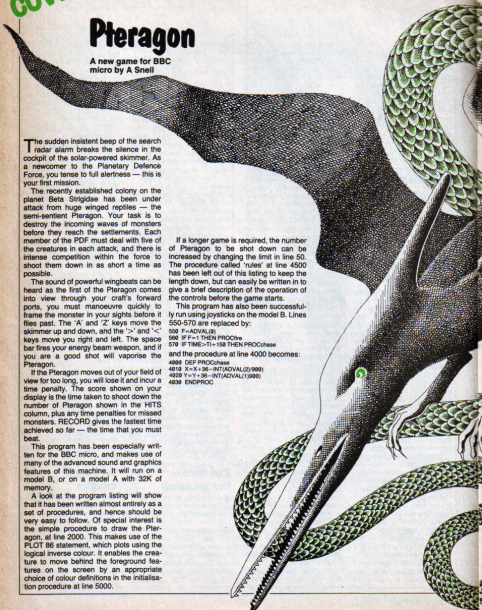
This program has been especially written for the BBC micro, and makes use of many of the advanced sound and graphics features of this machine. It will run on a model B, or on a model A with 32K of memory.

A look at the program listing will show that it has been written almost entirely as a set of procedures, and hence should be very easy to follow. Of special interest is the simple procedure to draw the Pteragon, at line 2000. This makes use of the PLOT 86 statement, which plots using the logical inverse colour. It enables the creature to move behind the foreground features on the screen by an appropriate choice of colour definitions in the initialisation procedure at line 5000.

If a longer game is required, the number of Pteragon to be shot down can be increased by changing the limit in line 50. The procedure called 'rules' at line 4500 has been left out of this listing to keep the length down, but can easily be written in to give a brief description of the operation of the controls before the game starts.

This program has also been successfully run using joysticks on the model B. Lines 550-570 are replaced by:

```
550 T=ADVAL(8)
560 IF F=1 THEN PROCfire
570 IF TIME>T1+150 THEN PROCchase
and the procedure at line 4000 becomes:
4000 DEF PROCchase
4010 X=X+36-INT(ADVAL(2)/900)
4020 Y=Y+36-INT(ADVAL(1)/900)
4030 ENDPROC
```





## LIST

```
1 REM *****
2 REM *
3 REM * P T E R A G O N *
4 REM *
5 REM * Copyright 1982 *
6 REM * A. J. Small *
7 REM *
8 REM *****
9 REM
10MODE1
20PROCInit
20PROCInit
40PROCShip
50FOR S=1 TO 5
60PROCgame
80NEXT
90PROCend
100IF G$="Y" THEN 50
110MODE7
120END
9901
9999REM *****
5000DEF PROCgame
510 X=-750/Y-228-RND(789)
520 OR=X/107*TIME-915-9
530 PROCwave
540 IF S=1 THEN 590
550 F=INT(Y/18)
560 IF F=1 THEN 530
570 IF F=32 THEN PROCfire ELSE PROCcha
580 IF H=8 THEN 530
590ENDPROC
9901
9999REM *****
5000DEF PROCShip
510 FOR T=PI/3 TO 2*PI STEP PI/3
520 PROCfill(898,295,T,PI/36,1)
530 PROCfill(298,256,T,PI/36,1)
540 PROCfill(148,16,T,PI/32,2)
550 SOUND1,-8,6,10NEXT
560 PROCfill(758,515,PI,PI/4,1)
570 PROCfill(758,536,PI,PI/4,2)
580 COL8,11PRINTTAB(9,29)*SCORE HI
TO RECORD
590 PRINTTAB(11,31)*8 0 "2
H01
1100 TIME=8
1110 VOU19,1,8,8,8
1120ENDPROC
9901
9999REM *****
5000DEF PROCfill(a,b,p,q)
510 COL8,q
520 MOVEa*SGIN(p-q),a*SGO(p-q)
530 MOVEa*SGIN(p-q),a*SGO(p-q)
540 PLOT8,b*SGIN(p-q),a*SGO(p-q)
550 PLOT8,b*SGIN(p-q),a*SGO(p-q)
560ENDPROC
19901
19999REM *****
2000DEF PROCb=s(a,y)
2010 MOVEa,y:MOVEa+32,y+10
2020 PLOT8,a+56,y+20
2030 PLOT8,a+88,y+40
2040 PLOT8,a+112,y
2050ENDPROC
29901
29999REM *****
2000DEF PROCgame
2510 SOUND8,-3,4,1
2520 VOU19,9,1,8,8,8
2530 PROCwave=GXO,UT
2540 PROCb=GXO,UT
2550 SOUND8,-3,5,1
2560 DX=X/107*Y
2570 X=X+RND(15151)*Y+RND(120)
2580 IF X<800 OR X>800 OR Y<789 OR Y>
789 THEN S=1:HS=HS+5:TI=TIME:PROCscore
2590ENDPROC
29901
29999REM *****
3000DEF PROCsea
3010 VOU19,6,5,8,8,9
3020 SOUND1,1,150,3
3030 FOR I=1 TO 2
3040 MOVE-102,-123:MOVE198,-94:PLOTO8,8,
-9,-5
3050 MOVE182,-123:MOVE198,-94:PLOTO8,8,
-5
3060 NEXT
3070 IF POINT(8,8)=8 THEN PROCast
3080 WFX15,9
3090ENDPROC
39901
39999REM *****
3000DEF PROCch
3010 SOUND8,2,4,20
3020 FOR I=15 TO 1 STEP -1
3030 PROCb=GXO,UT
3040 VOU19,8,1,9,8,8
3050 NEXT
3060 TI=TIME:HT=HT+1
3070 PROCscore
3080 H=1
3090 REPEAT UNTIL TIME-TI=180
3090ENDPROC
39901
39999REM *****
4000DEF PROCchase
4010 WFX15,8
4020 IF F=44 THEN X=X+36
4030 IF F=46 THEN X=X-36
4040 IF F=48 THEN Y=Y+36
4050 IF F=50 THEN Y=Y-36
4060ENDPROC
49901
49999REM *****
4000DEF PROCroles
4010ENDPROC
49901
49999REM *****
5000DEF PROCinit
5010 VOU19,VOU29,809,82,8,82
5020 COL8,11COL8,130
5030 ENVELOPE1,129,-8,8,15,8,127,8,
9,-127,176,8
5040 ENVELOPE2,129,8,8,180,8,127,-2,
8,-1,126,118
5050 VOU19,1,6,8,8,8
5060 VOU19,3,8,8,8,8
5070 VOU19,3,8,8,8,8
5080 CLTIME=288:MG=GTI=8
5090ENDPROC
59901
59999REM *****
5000DEF PROCtitle
5010 COL8,2
5020 MOVE-125,-200:PRINT"PTERAGON"
5030 MOVE-405,-478:PRINT"Copyright 1982
A. J. Small"
5040 PROCroles
5050ENDPROC
59901
59999REM *****
6000DEF PROCscore
6010 PROCfill(758,536,PI,PI/4,2)
6020 COL8,2:SGO=INT(TI/180)*HS
6030 PRINTTAB(18,31):SGO
6040 PRINTTAB(19,31):HT
6050 PRINTTAB(26,31):HS
6060ENDPROC
69901
69999REM *****
6000DEF PROCend
6010 REPEAT UNTIL TIME-TI=288
6020 COL8,2
6030 PRINTTAB(19,31):"ANOTHER GAME ? Y
/N"
6040 WFX15,9
6050 S=GXO
6060 IF INSTR("YN",G$)=8 THEN 6020
6070 IF G$="N" THEN 6030
6080 PROCfill(758,536,PI,PI/4,2)
6090 COL8,2:PRINTTAB(9,29)*SCORE HI
TO RECORD
6090 IF S=HS THEN HS=SC
6010 PRINTTAB(11,31)*8 0 "1
H01
6020 HT=GTSC=GTMS=8:TIME=8
6030ENDPROC
```



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# Street Life

## Oversize aquatic horror fitted with remote control

**David Kelly talks to Ulvatech about a rival to Jaws.**

If only Stephen Spielberg had known what he was starting when he filmed *Jaws*.

Ever since the killer fish made its debut, the screens have been filled with a succession of sharks, whales, squids, piranha and even a deadly beach ("just when you thought it was safe to go back in the water, you can't even get across the beach").

Now *The Pike* is planned — featuring a 12 ft-long micro-controlled monster. Providing the £2.5m budget can be raised, the film should go into production later this year, for release in 1983.

Work on the giant fish, controlled by an Acorn Atom, has been completed and the creature is undergoing 'sea' trials.

The huge man-eating pike has been designed and built by Ulvatech Ltd. Based in Ulverston, Cumbria, the four-year old company was formed by several former employees of Vickers Oceanic.

George Colquhoun, the company's managing director explained that Ulvatech specialises in underwater remote control devices and sonar equipment. Its most successful product is a scanning profiler which produces sea-bed cross-sections using a device incorporating a 6502 processor on the sea floor coupled to an LSI 11 surface computer.

It was on the strength of this device that

the Manchester-based film company, City Major, commissioned Ulvatech to build the giant pike.

Building the over-size aquatic horror was not easy. The basic design was produced by Ulvatech but the body of the fish was sculpted by Manchester artist Charles Wyatt.

To aid in the design, two live captive pike were studied and their movements video-taped to discover the secrets of their swimming action.

From the outside, the Ulvatech pike is distinguishable from the real thing only by its size.

The pike has been designed to swim under its own power. The tail and body of the 600lb model bend back and fore to propel it through the water. The motive force comes from a pneumatic system powered by compressed air containers inside the fish.

Christopher Edwards, Ulvatech's electronics expert, explained how the Acorn Atom is used to control the pike.

"We fitted one of Acorn's versatile interface boards to the Atom and used the 20mA serial output.

"The micro regularly sends an eight-line data bit to each address on the pike. The tail, body, rear fins, front fins, jaw and eyes can all be controlled."

There are 16 possible positions for each part of the fish. The control information is passed from the computer to the fish

through a thin umbilical wire. Of the eight data lines, four are used to show the address and four are used to set the position of that address.

The feedback output from each part of the pike is converted from analogue to digital. It is continuously matched in a central asynchronous decoder with the corresponding input from the micro.

Thus the positions of each part of the fish are updated eight times each second using information from the microcomputer.

Before the pike can be made to swim, the Atom generates a data table. Amplitude values are then picked off this table, held in Ram by the computer, and sent to the fish to produce the swimming movements.

"Obviously" said Christopher "it is a fairly unsophisticated data bank but, since each part of the fish can only register 16 positions, a more accurate system was unnecessary."

"We started the electronics part of the pike in January. The whole fish was completed and tested in our tank in May."

Since then the pike has undergone successful trials on Lake Windermere. According to Christopher Edwards the fish cost about £30,000 to make.

He says "It was great to work on. If we were all rich we could afford to play with it to our heart's content."

The giant pike is currently residing in Ulvatech's warehouse, waiting for City Major to begin filming.

### Errata

Jonathan Briggs is not forming a North-west London Spectrum User Group (*Popular Computing Weekly*, August 19). Please do not attempt to contact him.



Joan Collins (right), examining the giant Pike (left), whose exterior skin was constructed using a special fear-resistant silicon rubber reinforced with cotton muslin.

Copyright Lakeland Photographic, Kendal, Cumbria.

# Jupiter Ace makes Forth bid for stardom

**Boris Allan** presents the first review of the new Jupiter Ace and explains its use of the language Forth.

The Jupiter Ace is a microcomputer from two leading designers of the Sinclair Spectrum (Richard Altwasser and Steve Vickers). The Ace is based on the Z80A microprocessor, with 8K bytes of Rom and 3K bytes of Ram; has a Spectrum-style keyboard (though it is promised to be more positive); has a proper memory-mapped screen (unlike the Spectrum), with a 32 x 24 display on an ordinary television; and has sound and cassette facilities similar to those of the Spectrum, but no colour. It costs £89.95.

If the Ace sounds like a Spectrum under a different cover, it is not: the Ace is set apart from the Spectrum, and all other small microcomputers, by the use of the programming language Forth alone.

To emphasise, you cannot program the Ace in Basic, you have to use this rather different language Forth. Though it is an uncommon language, many people have recently become interested in Forth, and versions have appeared *inter alia* for the Atom, ZX81, MZ80K, BBC computer, and there is Forth available on the latest version of the Osborne 1.

For Forth to appear on the Osborne (a business machine) implies that this is a language which is beginning to make commercial sense.

When confronted with a machine with higher resolution graphics, and a claim from its designers that "Ace is ideal for games", the question is "why Forth and not Basic? Is Forth an easy language for beginners?"

In a way some people are afraid of Forth — a fear of the unknown? — as it seems

unnatural to type in  
2 5 +  
when you really mean

2 5  
If I ask you to add 2 and 5, you answer 7; if I ask you to take 2 and 5 and add them together, you will still answer 7. When you add two numbers you are doing something to those two numbers to produce a result (another number). In Forth it is clear you are doing something to numbers, to produce another number.

Forth says here are two numbers, add them together; 2 and 5 are the numbers, and + means 'add them together'

2 5 +  
It's not all that strange really. What is Forth? In essence Forth is a computer language which is truly interactive (almost as if it were a Basic in instant mode all the time), and it is a language which is truly extensible.

In Basic it is possible to add new functions and procedures, but very difficult to add new commands unless one uses machine code routines.

Forth is a very efficient language, much speedier than most Basics. The 8K of Rom in the Ace corresponds to a far greater amount of Rom for any Basic, and the 3K of Ram is worth more than 3K of Ram if

## Reviews



used by a Basic program.

The version of Forth used by the Ace is based, loosely, on two standards, FIG-Forth (Forth Interest Group) and Forth-79, but with important modifications. All the modifications seem to be improvements. I will examine some of them in more detail after I have looked at more general features, common to most Forths.

Forth is most notable for the way in which it uses basic functions (or procedures) to produce more powerful functions, so that, finally, the whole program (or 'application') is just one all-embracing function (or 'word').

Forth also uses a stack, and the user can control what happens on the stack. Think of the stack as a pile of numbers, on which you can put more numbers or take numbers off, but at one end only.

Suppose I want to multiply two numbers together. In Forth I say "here are two numbers, multiply them together"

2 5 \*  
and this line means take the numbers 2 and 5, multiply them together, and finally print out the result (which is what the " " means).

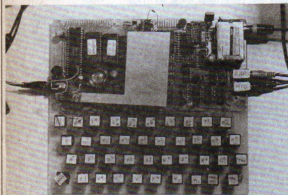
Forth copes with this line by starting at the left, and moving right. The first item encountered is "2" and this is recognised as a number. The number 2 is 'stacked' for later use. The second item is "5". This is a number and is stacked on top of the 2, for later use. When the program meets the word "\*" it knows that this means multiply. It multiplies the two numbers on the top of the stack (ie 2 and 5), so removes them and places the answer on top. When the word " " is met it is understood to mean print the value of the number on top of the stack and remove the number.

The word " " is not very self-explanatory, but in Forth if you do not like the name of a function/word you can change it, eg:

: PRINT . CR ;  
and now the word "Print" means do " " and then carriage return ("Cr"). The sum now looks like

2 5 PRINT  
and it is possible to continue.  
It would be nice to find the square of the number 7, and it could be done by

7 7 \* PRINT  
or, possibly  
7 DUP \* PRINT



Interior layout of a pre-production model of the Jupiter Ace.

where the word "Dup" means take the number on top of the stack (in this case 7) and put another copy on top of it (Duplicate). It would be nice to do this by just saying

7 SQUARED

and one can by

: SQUARED DUP \* PRINT;

which is a 'colon' of the word "Squared", which definition uses a word "PRINT" defined earlier. And so the process can continue.

In normal Forths editing words and

Vickers version of Forth (eg *Redefine* or *Fast* or *Edit*) which are worth incorporating in other versions.

I have found that Forth on microcomputers is not (generally speaking) user friendly — on most systems it is only too easy to find oneself in a situation where the only thing one can do is switch off and reload the Forth system. The Ace system is user-friendly, and difficult to crash.

The question of how user-friendly is the Ace is important because, being aimed, as it is, at the cheap end of the market and

aries and applications, often this will not be necessary. As Forth itself is in Rom, if the system does crash — Steve Vickers and I had great difficulty in performing this feat — if it does crash, Forth is not lost.

For a beginner, I do not think that Forth is intrinsically any more difficult to learn than Basic, if it is approached in the right manner; but even if it is not more difficult, is it any better? Altwasser and Vickers are, I believe, sincere in their belief that Forth is intrinsically a better language, and in one sense I agree. Forth is better because as we have seen it is possible (once the groundwork has been done) to perform complicated operations with a minimum of programming. Some of the queries come with "once the groundwork has been done".

The word "Squared" used another word "Print" and another word might use them both, but "Squared" could not use "Print" until we had defined "Print"; though with Ace Forth it is possible to give a dummy definition to "Print" (eg: PRINT;) and then later use "Redefine" to give a proper definition. A possible problem with this approach (for novice and not so novice) is the "design at the keyboard" syndrome. That is, it is easy to get tied up in the minutiae and lose sight of the overall structure. This is also a problem with most other languages, whether they be called structured or not.

I have a feeling that the Ace might well find a market as a cheap way of learning Forth (schools, colleges, and businessmen?) for some, and for others a cheap way of obtaining a machine with the speed of Forth (not far slower than poorly written machine code) for control applications. For those who would like to use the Ace for control applications, the way in which the Ace talks to the world is obviously important. The Ace talks via the television, and a rear port — the one I saw connected to the Ram pack. Richard Altwasser told me that they planned to provide means of coupling up to all the main interfaces one would need for use in control applications.

applications can be tedious (for reasons too tedious to explain) and the designers of the Ace had come to the same conclusion. In normal Forth it is possible to keep a copy of a definition on what is termed a 'screen', but once the definition has been compiled the internal workings cannot be changed. With the Ace there is no need to keep a separate copy of the listing of the definition — in fact one does not, in any case — and one can edit, list, and "Redefine" words (replace an earlier version of a word by the latest definition, and redefine any other definitions that are necessary).

Forths do not normally have floating point operations as part of the standard set of words, but the Ace has five special floating point words for use on six significant digits (1E-64 to 1E-64). Ace Forth also has inbuilt array using features.

In many respects the Ace has many of the good features of the Spectrum, very good cassette saving, loading, and verifying, good line editing, good user defined graphics capabilities. As a way of using Forth, it is excellent. Apart from these resemblances, the Ace is a very different machine because it is in black and white (though a colour facility is being considered), and it can use the ZX81 16K Ram pack (plus many of the other ZX81 add-ons). An easy machine to use.

Though the machine I used was not the final production version I have no doubts about the eventual production machine. I am sure that as a Forth machine it will be excellent. I think that given my use of Forth on the Ace there are many ideas in Steve

competing with cheaper black and white computers, and slightly more expensive colour computers, and as it uses what is a novel language, the Ace has to be user-friendly to succeed. Once one has the dictionary of words — tailored to one's own interest — to create sophisticated applications should not be as difficult as creating large programs in Basic. One word can stand for a program or a standard (often complex) facility.

Though it is possible to merge diction-



Steve Vickers puts the Jupiter Ace's keyboard through its paces.



Richard Altwasser "providing the Ace with interfaces for use in control applications".

# Open Forum

Open Forum is for you to publish your programs and ideas.  
It is important that your programs are bug free before you send them in. We cannot test all of them.  
Contributions should be sent to: Popular Computing Weekly, Hobhouse Court,  
19 Whitcomb Street, London WC2H 7HF.

## How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs.  
(The usual fee is £10.)

### Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

## Roman Numerals Converter

on ZX81

Roman numerals are found in the flyleaves of old books and on many old films, as well as on stones of old buildings and so on. In these contexts, they usually represent dates.

These strings of letters are often confusing and difficult to interpret. The following program interprets them for you. In addition, it will also convert any decimal number from 1 through 4999 to Roman numerals.

### Program notes

Lines  
00 LET RS="XCXCVLD"  
110 LET XS=""  
120 INPUT AS  
130 IF AS="STOP" THEN STOP  
140 SCROLL  
150 PRINT AS

```
160 IF AS<"A" THEN GOTO 350
170 FOR J=1 TO LEN AS
180 LET YS=""
190 LET A=VAL AS(LEN AS-J+1)
200 IF A AND A<5 OR A=9 THEN LET
    YS=YS+RS(J)
210 IF A>3 THEN GOTO 280
220 LET A=A-1
230 IF A>9 THEN GOTO 200
240 LET XS=YS+XS
250 NEXT J
260 PRINT XS
270 GOTO 180
280 IF A=9 THEN GOTO 330
290 IF J=4 THEN GOTO 220
300 LET YS=YS+RS(J+4)
310 LET A=A-5
320 GOTO 230
330 LET YS=YS+RS(J+1)
340 GOTO 240
350 IF AS<"C" THEN GOTO 100
360 LET I=1
370 LET V=5
380 LET X=10
390 LET L=50
400 LET C=100
410 LET D=500
420 LET M=1000
430 LET T=0
440 FOR J=2 TO LEN AS
450 LET B=VAL AS(J-1)
460 LET E=VAL AS(J)
470 IF E>B THEN GOTO 530
480 LET T=T+B
490 NEXT J
500 LET T=VAL AS(LEN AS)+T
510 PRINT T
520 GOTO 100
530 FOR K=J-1 TO 1 STEP -1
540 IF AS(K)<>AS(J-1), THEN GOTO 480
550 LET E=VAL AS(K)
560 LET T=T-2+E
570 NEXT K
580 GOTO 480
```

To operate this program, Run, and enter either:

- a decimal number (not exceeding 4999) for conversion to Roman numerals, or
- a Roman numeral (not exceeding MMMCMXCIX) for conversion to decimal.

Press newline. The number you entered is displayed on the left, the conversion on the right.

## ZX Artist

on ZX81

This art program gives the user all the usual things other art programs give plus the facility to draw a straight line from one

given point to another, draw a circle and provide the co-ordinates for plotting.

The program also incorporates one point plotting, the ability to draw lines using the cursor keys, copy pictures on to the printer and store pictures on tape.

When the program is Run the user is given the choice of 10 options to choose from.

Option "0" will first ask the user for a starting point (X and Y co-ordinates) and then hand all control over to the user with the cursor keys.

### Option selection

The user can leave this part of the program any time and return to the option section of the program by pressing the "9" key.

Option "1" will ask for co-ordinates and plot a single pixel on that point.

Option "2" will ask for co-ordinates and unplot a single pixel on that point.

Option "3" will ask for starting co-ordinates and finishing co-ordinates and will plot a line between them.

Option "4" will do the same as option "3" but will unplot a line between the co-ordinates.

Option "5" will ask for X and Y co-ordinates and a radius. It will then ask for how much of a circle the user wants by using the numbers 0-40. 0-10 will plot the first quarter of a circle, 10-20 the second etc. 0-20 would plot the first half of the circle.

Option "6" does the same as option "5" but unplots the circle.

Option "7" copies the border and its contents on to the printer.

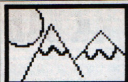
Option "8" saves the program and the screen on to tape.

Option "9" stops the program.

### Program notes

Lines  
10-100 set up the screen.  
110-180 sort out the options.  
200-270 provide option "0".  
1000-1100 provide option "1".  
2000-2010 provide option "2".  
3000-3210 provide option "3".  
4000-4010 provide option "4".  
5000-5100 provide option "5".  
6000-6010 provide option "6".  
7000-7110 provide option "7".  
8000-8040 save the program and screen.  
9000 stops the program.

## Open Forum



```

10 PRINT "      881111122222233333
444445555566666
222223333344444
0248503248502488

```

```

40 FOR K=36 TO 10 STEP -2
50 PRINT K: TAB 31:
60 NEXT K
70 PRINT "  TAB 31:"
80 PRINT "  TAB 31:"
90 PRINT "  TAB 31:"
100 PRINT "  TAB 31:"

```

```

110 INPUT R;PRINT R;GOTO 10
120 GOTO 10
130 LET C=INT(R)
140 IF C=0 OR C=5 THEN GOTO 120
150 IF C=1 THEN GOTO 160
160 IF C=2 THEN GOTO 170
170 IF C=3 THEN GOTO 180
180 GOTO 130
190 LET S=INVERSE
200 PRINT S
210 IF S="N" THEN LET X=X+C*5
220 IF S="S" THEN LET X=X+C*6
230 IF S="7" THEN LET Y=Y+C*4
240 IF S="8" THEN LET Y=Y+C*3
250 IF S="9" THEN GOTO 130
260 GOTO 10
270 PRINT AT 21.0;"INPUT ""Y""";
280 INPUT Y
290 LET Y=INT Y
300 IF Y/4 OR Y/37 THEN GOTO 10

```

```

0000 IF Q=1 THEN PLOT X,Y
0000 IF Q=2 THEN UNPLOT X,Y
0000 RETURN
0000 GOTO 1000
0010 RETURN
0020 GOTO 1000
0030 INPUT "X=?:" X
0040 CO-ORDINATE (X,0)
0050 LET X=INT X
0060 IF X#0 OR X#61 THEN GOTO
0070
0080 PRINT AT 21,0:"INPUT "Y=?:"
0090 CO-ORDINATE (41,37)
0100 LET Y=INT Y
0110 IF Y#4 OR Y#37 THEN GOTO
0120
0130 LET S=0
0140 LET X1=X+X
0150 LET X1=X-X
0160 LET Y1=Y+Y
0170 LET Y1=Y-Y
0180 IF ABS Y1>3 THEN LET Z=ABS

```

```

3150 FOR F=1 TO I-1
3160 IF Q=3 THEN PLOT S+X.N+Y
3170 IF Q=2 THEN UNPLOT S+X.N+Y
3180 LET
3190 LET N=N+V1/2
3200 NEXT F
3210 RETURN
4000 GOSUB 3000
4010 RETURN
5000 SCRUN 1000
5010 POINT 01 31.61 INPUT SCREEN

```

```

0010 PRINT AT 21.0; "INPUT CURVE"
0020 INPUT R
0030 PRINT AT 21.0; "INPUT CURVE"
0040 CO-ORDINATE 1 (-R,0)
0050 INPUT C1
0060 IF C1=0 OR C1>30 THEN GOTO
0070
0080 PRINT AT 21.0; "INPUT CURVE"
0090 CO-ORDINATE 2 (-C1,-R)
0100 TURN C1
0110 IF C2=C1 OR C2>48 THEN GOTO
0120
0130 FOR K=1 TO C2 STEP .25

```

```

5100 LET A=X/320*PI
5110 LET X=X+R*5*PI/4 IN R
5120 LET YY=Y+R*5*PI/4 IN R
5130 IF XX<0 OR XX>4 OR YY<4 OR
YY>7 THEN GOTO 5150
5135 IF Q=5 THEN PLOT XX,YY
5140 IF Q=5 THEN UNPLOT XX,YY
5150 NEXT R
5160 RETURN
5000 GOSUB 5000
5010 RETURN
7000 PRINT AT 0,0;"

```

```
7010 PRINT AT 1,0;"
7020 PRINT AT 21,0,
7030 FOR K=2 TO 20
7040 PRINT AT K,0;"
7050 NEXT K
7060 COPY
```

```

7070 PRINT AT 0.3: "6011111222233
7080 PRINT AT 1.5: "2246666246664
7090 PRINT AT 4.5: "4488888844888
7100 FOR #=56 TO 100 STEP .5
7110 PRINT AT J.#R:
7120 LET J=J+1
7130 NEXT #
7140 PRINT AT 17.5: "6
7150 PRINT AT 18.5: "6
7160 PRINT AT 19.5: "4
7170 RETURN
7180 LET #=1
7190 PRINT AT 11.#: "ARTIST
7200 RECOVER THEN "NAME"
7210 GOTO 500
7220 RETURN

```

**ZX Artist**  
by Clive Carter

**Tate Gallery**

on Spectrum

This program represents my computer's answer to the Tate Gallery. It can produce a veritable exhibition of Modern Masters, each quite different and each jam-packed with significance. I hope it proves that computers have soul, too.

I have used an interesting *Poke* in the program. On the ZX81 *Poke* 16510,0 gave the first line of the program the number 0. This is more difficult on the Spectrum as the program area moves about in memory. It can, however, be reproduced by the command:

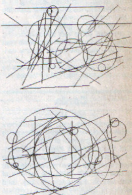
PEEK/PEEK 23635 + 250 + PEEK 23635 + 11.0

Once a program line has been given the line number 0 it cannot be tampered with, even by accident, except by Poking it once again. It is therefore useful for copyright statements.

```

000000 @ Chris Timson 1988
10 0000
20 0000 Not age 11
30 0000 Modern Art
40 0000
50 0000 BRING BACK CITIZEN PAINT
60 0000 *****
70 0000 BANGORIZE
80 0000
90 0000
100 0000 PAGE 2: INK 7: C

```



## Tate Gallery

by Chris Timson

## Beeps

on Spectrum

Most Spectrum owners will be aware of the Beep statement and its format: Beep duration, pitch. But there is a surprising lack of use of the statement in programs published so far.

There are probably two main reasons for the absence of Beeps:

1. Processing stops during Beep
2. Lack of musical knowledge.

While it is true that in a fast-moving 'invaders' type game Beep can slow things right down, there is no reason why instructions, features and finales in programs should not have a musical accompaniment.

Moon Cresta and Intro/Outro are two routines which can easily be incorporated into your programs. Moon Cresta is useful as a musical countdown to the start of a game and is similar to the arcade game tune.

Intro/Outro is a posh way of introducing a program and giving a fine musical finale. If you use these routines in a program which has other *Data* lines be sure to change the *Restore* statements to reset

```

110 FOR n=1 TO 35
120 IF RND>.7 THEN GO TO 400
125 RND=RND*2+1:J=J+1:Z=Z+1
130 LET A=RND*355:LET B=RND*17
135 LET C=RND*17:IF J=1 THEN LET C=B+17
140 IF RND<.5 THEN LET B=0
145 IF RND<.5 THEN OR A+C<0 THEN
150 GO TO 330
160 IF B>+.175 OR B<=0 THEN
170 PLT A,B:GOTO C
180 IF B<0 THEN
190 LET B=ABS CIRCLE
410 LET A=RND*355:LET B=RND*17
420 IF B<+.175 OR A+C<0 THEN
430 IF B<+.175 OR B<=0 THEN
440 GO TO 400
450 C=CIRCLE A,B,B
600 NEXT A
610 KEY$="ENTER":TO REPEAT
620 INPUT "Beat 1-61: P:2320"
LINE #5

```



# Open Forum

each note and on line 150, 12 is subtracted to lower the pitch one octave. On line 340, 24 is subtracted to lower the pitch by two octaves.

The N loops are equal to the number of chords in the Data lines. The K loops select the entire six notes in each chord (see line 150), and only the first three notes (line 340).

When the program is Run you should hear a fair rendition of House of the Rising Sun, followed by a short pause for applause. Next, something which sounds like Womoweh and goes on for ever (just like the real thing). Hold down any key for a few seconds and the program jumps to the random composer routine.

The last short program is purely visual and produces some very effective moving displays. Run it and watch for a while then experiment with new values for the variables on line 100.

The values for e and t should always be equal to or greater than the x,y values.

## Cards

on BBC Micro

The enclosed code uses a very efficient 'sample without replacement' technique to simulate dealing a deck of cards.

Call Procmaekdeck to initially and whenever you want a fresh deck. Use Fndval to return the number of the next card dealt. At any time, Deck(0) holds the number of cards left in the pack, N say, and Deck(N+1), Deck(N+2) etc is a complete history of previously-dealt cards.

The algorithm can easily be adapted for other purposes such as pools coupons — simply set Ncard to 55 or whatever value is required and redimension Deck accordingly.

## Casio

on BBC Micro

With the advent of user defined graphics on most of the new micros, there have been a number of sophisticated programs to decode binary patterns into numbers which are then used to define the shape.

These programs can be useful. However, I know that there are thousands of people who want to define a shape simply while in the middle of writing a program.

I use either a Casio FX802P calculator with a simple binary to decimal routine or I program a function key on my BBC micro with either of these methods.

If you know the method, it is easy to write a program to convert decimal to binary and back. However, it is not quite so easy to do it on one line (as is needed for a function key). The reason for this is that if Then statements are very difficult to implement (since if the outcome is false, there is no new line number to execute so the routine terminates) and the Else command can over-complicate things.

Line 40 overcomes this problem, as the loop selects the binary digits one at a time

```

10 REM Auto Accessio
11 REM by Brian
12 REM Assign chords a number
13 LET A=1: LET C=0
14 LET D=3: LET F=4
15 LET E=5: LET G=6
16 REM Set up strings to hold
17 REM the notes for each chord
18 LET C(1)="GGGGGGGGGG"
19 REM CHORDS FOR each note
20 LET C(2)="121212121212"
21 REM CHORDS
22 LET C(3)="142123232323"
23 LET C(4)="172124242424"
24 REM CHORDS
25 LET C(5)="162223232323"
26 LET C(6)="192224242424"
27 REM RETURN
28 REM 60 House of Rising Sun
29 FOR N=1 TO 16
30 FOR K=1 TO 11 STEP 2
31 REPEAT 100 C(Chord,K)+1
32 UNTIL C(Chord,K)+1=100
33 NEXT K
34 NEXT N
35 REM House of the Rising Sun
36 DATA A,B,C,D,E,F,A,B,C,D,E,F,A,B,C
37 REM 60 House of the Rising Sun
38 REM 60 House of the Rising Sun
39 REM 60 House of the Rising Sun
40 REM 60 House of the Rising Sun
41 REM 60 House of the Rising Sun
42 REM 60 House of the Rising Sun
43 REM 60 House of the Rising Sun
44 REM 60 House of the Rising Sun
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49 REM 60 House of the Rising Sun
50 REM 60 House of the Rising Sun
51 REM 60 House of the Rising Sun
52 REM 60 House of the Rising Sun
53 REM 60 House of the Rising Sun
54 REM 60 House of the Rising Sun
55 REM 60 House of the Rising Sun
56 REM 60 House of the Rising Sun
57 REM 60 House of the Rising Sun
58 REM 60 House of the Rising Sun
59 REM 60 House of the Rising Sun
60 GO TO 510

```

```

10 REM Impressive Info-Outro
11 REM by Brian
12 REM Data is a Diminished C
13 REM Chord
14 DATA 0,0,0,15,0,0,0
15 LET A=0.001
16 REM UP
17 FOR N=00 TO 40 STEP 0: REM
18 FOR K=1 TO 7: READ X: DEEP
19 .001 X
20 NEXT K: NEXT N: DEEP 2.0+X
21 REM DOWN
22 FOR N=40 TO -20 STEP -3: RE
23 STORE
24 FOR K=1 TO 7: READ X: DEEP
25 .001 X
26 NEXT K: LET Y=X+.002: NEXT
27 DEEP 3.0+X: DEEP 1.0+X: DE
28 .001 X
29 REM 60 House of the Rising Sun
30 DATA A,B,C,D,E,F,A,B,C,D,E,F,A,B,C
31 REM 60 House of the Rising Sun
32 REM 60 House of the Rising Sun
33 REM 60 House of the Rising Sun
34 REM 60 House of the Rising Sun
35 REM 60 House of the Rising Sun
36 REM 60 House of the Rising Sun
37 REM 60 House of the Rising Sun
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54 REM 60 House of the Rising Sun
55 REM 60 House of the Rising Sun
56 REM 60 House of the Rising Sun
57 REM 60 House of the Rising Sun
58 REM 60 House of the Rising Sun
59 REM 60 House of the Rising Sun
60 GO TO 510

```

Beeps  
by Ron Smith

```

10 REM INSERT FOLLOWING LINES IN MAIN PROGRAM
20 NCARD=52
30 DIM DECK(N)
40 REM
50 REM ...
60 REM ...
70 DEFFROCKMAEKDECK
80 LOCAL IN
90 FOR I=1 TO 52:DECK(I)=IN:NEXT
100 DECK(I)=NCARD
110 ENDPROC
120 REM
130 DEFFINDDEAL
140 LOCAL N,N2,N3
150 N=DECK(I):IF N=0 THEN PROCMAEKDECK:N=NCARD
160 N2=DECK(N)
170 N3=DECK(N2)
180 DECK(I)=N2:DECK(N)=N3
190 DECK(N2)=N:DECK(N3)=N2
200 DECK(N)=N3
210 DECK(N3)=N
220 DECK(N)=N2
230 DECK(N2)=N
240 DECK(N)=N3
250 DECK(N3)=N
260 DECK(N)=N2
270 DECK(N2)=N
280 DECK(N)=N3
290 DECK(N3)=N
300 DECK(N)=N2
310 DECK(N2)=N
320 DECK(N)=N3
330 DECK(N3)=N
340 DECK(N)=N2

```

Cards  
by David Guest

using Mid\$. If the digit is a one. Total=Total+(Power\*1) so the total is updated. However, if the digit is a zero, Total=Total+(Power\*0) so the total remains the same.

It is useful to convert from decimal to binary as well. Line 20 does this. The only point to mention here is the X780= which

is the same as 7(80+X)=. The routines are in the form of a program for convenience and should be typed in using <KEY>. LINE 20. " with the return character after the Next. I don't think the computer tokenises key words in function keys, so use abbreviations where possible.

```

10 REM 60 House of the Rising Sun
20 REM 60 House of the Rising Sun
30 REM 60 House of the Rising Sun
40 REM 60 House of the Rising Sun
50 REM 60 House of the Rising Sun
60 REM 60 House of the Rising Sun
70 REM 60 House of the Rising Sun
80 REM 60 House of the Rising Sun
90 REM 60 House of the Rising Sun
100 REM 60 House of the Rising Sun
110 REM 60 House of the Rising Sun
120 REM 60 House of the Rising Sun
130 REM 60 House of the Rising Sun
140 REM 60 House of the Rising Sun
150 REM 60 House of the Rising Sun
160 REM 60 House of the Rising Sun
170 REM 60 House of the Rising Sun
180 REM 60 House of the Rising Sun
190 REM 60 House of the Rising Sun
200 REM 60 House of the Rising Sun
210 REM 60 House of the Rising Sun
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230 REM 60 House of the Rising Sun
240 REM 60 House of the Rising Sun
250 REM 60 House of the Rising Sun
260 REM 60 House of the Rising Sun
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360 REM 60 House of the Rising Sun
370 REM 60 House of the Rising Sun
380 REM 60 House of the Rising Sun
390 REM 60 House of the Rising Sun
400 REM 60 House of the Rising Sun
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420 REM 60 House of the Rising Sun
430 REM 60 House of the Rising Sun
440 REM 60 House of the Rising Sun
450 REM 60 House of the Rising Sun
460 REM 60 House of the Rising Sun
470 REM 60 House of the Rising Sun
480 REM 60 House of the Rising Sun
490 REM 60 House of the Rising Sun
500 REM 60 House of the Rising Sun
510 REM 60 House of the Rising Sun
520 REM 60 House of the Rising Sun
530 REM 60 House of the Rising Sun
540 REM 60 House of the Rising Sun
550 REM 60 House of the Rising Sun
560 REM 60 House of the Rising Sun
570 REM 60 House of the Rising Sun
580 REM 60 House of the Rising Sun
590 REM 60 House of the Rising Sun
600 REM 60 House of the Rising Sun

```

BBC/Casio  
by Gareth Jones





from previous page

PROGRAM OF THE WEEK

```

B90PROCSCORE
900SOUND0,2,4,10:MOVEXX+P*%X,YY+P*%Y
910PROCFLASH(17,32)
920VDU9,127,127,11,9,9,127,127,9,10
930QZ=XX+P*%X:WZ=YY+P*%Y:FORVZ=1TO3:IFPZ(VZ,0)>QZ-B0 ANDPZ(VZ,0)<QZ+B0 ANDPZ(V
X,1)>WZ-B0 ANDPZ(VZ,1)<WZ+B0 PZ(VZ,0)=RND(12B0):PZ(VZ,1)=RND(1024)
940NEXTVZ
950PROCFLASH(3,32)
960ENDPROC
970DEFFPROCDOOV
980FORJX=1TO3:MOVEPZ(JX,0),PZ(JX,1):VDU9,127
990FORKX=0TO1:PZ(JX,KX)=PZ(JX,KX)+RND(50):RND(50):IFPZ(JX,KX)>1000 OR PZ(JX,KX
)<0 PZ(JX,KX)=500
1000NEXTKX:IFPZ(JX,0)>XX-30 ANDPZ(JX,0)<XX+30 ANDPZ(JX,1)>YX-30 ANDPZ(JX,1)<YX+
30 PROCNUC
1010MOVEPZ(JX,0),PZ(JX,1):VDU224
1020NEXTJX
1030ENDPROC
1040DEFFPROCNUC:LX=LX-1
1050PROCSCORE
1060SOUND0,2,6,10
1070MOVEXX,YX
1080PROCFLASH(17,400):PROCFLASH(3,400)
1090ENDPROC
1100DEFFPROCFLASH(D,L)
1110PLOT0,0,L:PLOT0,0,-L:PLOT0,L,L:PLOT0,-L,-L:PLOT0,L,0:PLOT0,-L,0:PLOT0,L,-L
PLOT0,-L,L:PLOT0,-L,0:PLOT0,L,0:PLOT0,-L,-L:PLOT0,L,L:PLOT0,-L,0:PLOT0,L,0:PLOT0
,-L,L:PLOT0,L,-L
1120ENDPROC
1130DEFFPROCSCORE
1140VDU4,30:PRINT"SCORE ";H*50+H% TAB(18);"SHOTS ";S% TAB(28);"LIVES ";LX;" ";
VDU5
1150ENDPROC

```

Tri-olds  
by John Murphy

## Pucman

on Vic-20

This program is entitled Vic Pucman and it runs on the unexpanded 3.5K Vic. The variables list is as follows:

Z — is the position of you.  
Q — is the position of the computer.  
OO — is the number of dots which have been eaten.

SC — is your score.  
HS — is the high score.  
S — is the music variable.  
XC — is the second highest score.  
NAS — is the name of the person who has the high score.

The program is based on the popular game Pucman, where a ghost chases you round a maze of dots and circles.

In my version the 'O' gives you 50 points and the '.' gives you 10 points. When the maze has been cleared your score, if bigger than the high score, is recorded.

### Program notes

- Lines
- 0-2: Set up variables.
- 10-75: Draw the maze.
- 80-130: Decide which way you move.
- 151-200: Decide where computer moves.
- 203-752: Decide whether you have crashed into the wall of the maze or not, also how much you score.
- 803-960: Decide whether the computer has crashed into the wall or not and count the number of dots that have been eaten.
- 1000-1050: Play a tune.
- 1055-1210: Show the high score when the game is over and tell you that you have lost.
- 2050-2070: Input the high score's name.
- 2080-2090: Are the instructions and titles.

```

0 2=3:0=413:POKE36876,15:GOSUB6000:POKE650,129
1 PRINT"Q:12=23:0=25:POKE36876,15:RESTORE SC=0:DO=5
2 POKE36879,0:PRINT"
5 PRINT"
10 PRINT"
20 PRINT"
30 PRINT"
40 PRINT"
50 PRINT"
60 PRINT"
61 PRINT"
62 PRINT"
63 PRINT"
64 PRINT"
65 PRINT"
66 PRINT"
67 PRINT"
68 PRINT"
69 PRINT"
70 PRINT"
71 PRINT"
72 PRINT"
73 PRINT"
74 PRINT"
75 PRINT"
80 POKE7680+Z,89
81 POKE36876,0
82 IFZ=0THENRESTORE:GOTO1055
83 PRINT"
84 IFPEEK(197)+48THENPRINT"YOU QUIT!"END
85 IFDO=195THENPRINT"MOVE ENTER ALL THE MAZE!"GOTO1055
86 GOTO5
100 IFB="Y"THENPOKE7680+Z,32:Z=Z-2:GOSUB6000:POKE36876,241
110 IFB="N"THENPOKE7680+Z,32:Z=Z+2:GOSUB6000:POKE36876,245
120 IFB="J"THENPOKE7680+Z,32:Z=Z+1:GOSUB6000:POKE36876,135
130 IFB="I"THENPOKE7680+Z,32:Z=Z-1:GOSUB6000:POKE36876,135
151 POKE7680+Z,127
152 POKE36876,0:FORI=157095TO1:POKE36879,T:INEXTT
160 POKE7680+Z,65
170 IFB="Y"THENPOKE7680+Z,32:Q=Q-2:GOSUB6000
180 IFB="N"THENPOKE7680+Z,32:Q=Q+2:GOSUB6000
190 IFB="J"THENPOKE7680+Z,32:Q=Q+1:GOSUB6000
200 IFB="I"THENPOKE7680+Z,32:Q=Q-1:GOSUB6000
210 POKE7680+Z,87

```

## Open Forum

```

0000 00000000
497 END
600 IPFEK(7680-Z)=102THEND=Z+22
681 IPFEK(7680-Z)=46THEND=9C+10:30+0=1
602 IPFEK(7680-Z)=81THENPOKE36876,195:9C+9C+50
610 RETURN
653 IPFEK(7680-Z)=102THEND=Z-22
651 IPFEK(7680-Z)=46THEND=9C+10:30+0=1
652 IPFEK(7680-Z)=81THENPOKE36876,195:9C+9C+50
668 RETURN
700 IPFEK(7680-Z)=102THEND=Z+1
701 IPFEK(7680-Z)=46THEND=9C+10:30+0=1
702 IPFEK(7680-Z)=81THENPOKE36876,195:9C+9C+50
710 RETURN
750 IPFEK(7680-Z)=102THEND=Z+1
751 IPFEK(7680-Z)=46THEND=9C+10:30+0=1
752 IPFEK(7680-Z)=81THENPOKE36876,195:9C+9C+50
760 RETURN
880 IPFEK(7680-Z)=102THEND=0+22
881 IPFEK(7680-Z)=46THEND=00+1
810 RETURN
850 IPFEK(7680-Z)=102THEND=0+22
851 IPFEK(7680-Z)=46THEND=00+1
960 RETURN
980 IPFEK(7680-Z)=102THEND=0+1
981 IPFEK(7680-Z)=46THEND=00+1
910 RETURN
950 IPFEK(7680-Z)=102THEND=0+1
951 IPFEK(7680-Z)=46THEND=00+1
960 RETURN
1000 READS
1001 IPS=-230RS-210RS=-220RS=-10RS=80RS
      =10RS+230RS=230RS+22THEND=207
1002 DATRQ15,215,225,225,225,215,231,231,231,231,231,231,232,228,228,228,231,225
,225
1003 DATRQ25,228,219,219,219,219,225,215,215,215,215,225,225,225,225,215,215,231
,231
1004 DATRQ31,231,231,235,228,228,231,225,225,225,225,228,219,225,215,225,225,6
10011 IPS=6 THENPOKE36876,0:POKE36874,0:RETURN
10020 POKE36876,5:POKE36874,5
10030 FORV=1:10100:NEXTV
10031 POKE36876,0:FORV=0:10100:5:POKE36876,V:NEXTV
10040 IPS=-1:7680-POKE36876,0:0:0:0:0:0:0
10050 GO:10100
10051 GO:10100
10052 GO:10100
10053 GO:10100
10054 GO:10100
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10272 GO:10100
10273 GO:10100
10274 GO:10100
10275 GO:10100
10276 GO:10100
10277 GO:10100
10278 GO:10100
10279 GO:10100
10280 GO:10100
10281 GO:10100
10282 GO:1
```

**Pucman**  
by Nicholas Webster

## A GREAT NEW COMPETITION WORTH £THOUSANDS TO THE WINNER

**Fancy your chances?**

**F** We're looking for a bright young thing who can out-shine all the commercial software houses and come up with a sparkling new program that can be marketed commercially.

We want you to prove you can write a selling program and if you win the competition you'll be well on the way to making big money.

The winner will receive:

1. A Dragon 32 computer.
2. Advice from *Popular Computing Weekly* on how to market and sell the winning software and how to form and finance the company to do so.
3. £2,000-worth of free advertising in *Popular Computing Weekly*.

The winner will be the author who submits the most commercially viable program together with a written outline of the author's own proposals on how he would run his software house and why he would like to do it. The judge will be *Popular Computing Weekly* editor, Brendon Gore.

If a number of equally good and commercially viable programs are submitted, the decision of the overall winner will be based on the best accompanying written outline of the author's proposals for running a software house.

Entries to the award scheme must be accompanied by at least four out of five of the numbered coupons published in *Popular Computing Weekly* throughout September. The closing date for the competition is October 18. The winning entry will be announced in the issue published on November 18.

Abstract

1. There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.
2. Closing date for entries is October 18, 1982.
3. The names of the winners will be announced in the November 18 issue of Popular Computing Weekly.
4. The Judges' decision is final.
5. No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the competition.

## Popular Computing Weekly

### Whizz-Kid '82 Scheme

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: Popular Computing Weekly, Whizz-Kid '82, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME: .....  
ADDRESS: .....  
.....  
.....

②

# Programming

## Automatic relocation subroutine

**Malcolm Peltz** presents a relocation program for the expanded Vic20.

This subroutine (Fig 1) will allow a program on Vic20, with 8K or more expansion, to relocate itself automatically beyond the user defined character set. The subroutine is self-contained.

Line 10 checks to see if the program has already been relocated or if it has any expansion memory in which to relocate. If the program has already been relocated it will not repeat the process. Lines 20-40 work out the last address of the program, while line 50 uses this last address to test whether or not there is sufficient memory available to relocate the program.

Lines 60-70 then move the program backwards, to avoid overwriting itself.

```
10 IFPEEK(44)=360RPEEK(56)=32THEN200
20 A=PEEK(43)+256*PEEK(44):L0=A
30 IFPEEK(A)=0ANDPEEK(A+1)=0THEN50
40 A=PEEK(A)+256*PEEK(A+1):GOTO30
50 HI=A+1:IFHI+4609>PEEK(55)+256*PEEK(56)THEN
PRINT"NOT ENOUGH ROOM TO MOVE THIS PROGRAM":END
60 FORA=HI+1TOLO-1STEP-1
70 POKEA+4608,PEEK(A):NEXTA=L0
80 IFPEEK(A+4608)=0ANDPEEK(A+4609)=0THEN120
90 POKEA+4609,PEEK(A+4609)+18
100 X=PEEK(A+4608):Y=PEEK(A+4609)
110 A=PEEK(A+4608)+256*(PEEK(A+4609)-18):GOTO80
120 X=X+2:IFX>255THENX=X-255:Y=Y+1
130 POKE47,X:POKE48,Y
140 POKE49,X:POKE50,Y
150 POKE45,X:POKE46,Y
160 POKE43,1:POKE44,36
170 RUN
200
```

Fig 1

Lines 80-120 re-adjust the links used by Vic Basic and determine where the variables may start. Lines 130-160 Poke these values into the appropriate locations and set the new start of Basic.

Line 170 then runs the relocated program, which starts at line 200. This time the test at line 10 will be true and the Goto taken. Line 170 could read RUN 200 if you wish.

READY.

```
1 PRINT"PLEASE WAIT!"
5 POKE56,30:POKE52,30:POKE644,30:POKE44,16
6 POKE642,16:POKE4696,0:CLR
10 FORI=7690TO8191:POKEI,32:POKEI+30720,1:NEXT
20 POKE210,30:FORI=217TO228:POKEI,158:NEXT
30 POKE229,159:POKE230,159:POKE231,31
40 FORI=232TO240:POKEI,159:NEXT
50 POKE244,151:POKE648,30
60 POKE36869,240:POKE36866,150
70 END
```

READY.

READY.

Fig 2

## Contact wear problem solved

**J S and J C Dale** explain how to run machine code games on an expanded Vic20.

After buying an expansion unit and a 16K Ram pack for my Vic, I was very disappointed when I found that I could no longer run my machine code games. The only way to run these games was to remove the Ram pack, but this wears down the contacts.

Under great pressure from my children, my eldest son and I, armed with Nick Hampshire's excellent book *The Vic Revealed*, set about solving this problem. The accompanying listing (Fig 2) is the result.

Before any game written for an unexpanded Vic is loaded, this program should be loaded and run. The relevant program may then be loaded and run without removing the Ram pack.

If you want to write a program immediately after running the conversion program, type in *New* before starting. Otherwise a Syntax error will result.

**Important** — After using the unexpanded program, ensure that you reset the Vic by typing *SYS64802* then press *return*.

# Spectrum

In this new slot various contributors explore different aspects of the ZX Spectrum.

This program was designed to be used by schools or small businesses, to keep track of used stock. It also enables you to quickly discover which items are in short supply and therefore need to be re-ordered. The suppliers reference number is also listed, to make re-ordering even easier.

Items can be altered, entered or deleted at will, as there is a comprehensive selection. After being entered, stock items can be altered as they are used by inputting the number of items used preceded by a minus sign.

A copy of the current stock position or of the items that need to be re-ordered, can be obtained with a printer using Copy. When a list is required of the final few items, ie not a complete screenful, just press Break followed by CIs and Cont.

## Tracking down the missing supplies

*J Reynolds stock control program keeps track of your business.*

On the 16K Spectrum this program will hold 125 separate items. If more items are required, you can use separate tapes for different types of stock. For example, stationery could be kept on one tape and painting materials on another. Sasco Slot-

index panels can be used to keep day to day track of stock levels so that information in the computer can be updated at weekly or monthly intervals.

In the event of any problems Goto 1000 will obtain the menu selection, so avoiding the loss of any variables which have been inputted.

### Program notes

Line 10 sets up the arrays.  
1010-1090: Menu selection.  
1100-1150: This is the area of the programme dealing with the selection.  
2000-2110: This part deals with alteration to the stock levels.  
3000-3040: Enters the stock.  
4000-4070: Lists the stock.  
5000-5040: Lists items to be re-ordered.  
6000: Saves and verifies.  
7000-7930: Deletes items.

```

1 REM STOCK CONTROL
10 DIM A$(100),B$(100),C$(100),D$(100),E$(100),F$(100),G$(100),H$(100),I$(100),J$(100),K$(100),L$(100),M$(100),N$(100),O$(100),P$(100),Q$(100),R$(100),S$(100),T$(100),U$(100),V$(100),W$(100),X$(100),Y$(100),Z$(100)
20 LET A$=""
30 BORDER 0: PAPER 2: INK 7: C 15
40 GO SUB 9000
1000 BORDER 0: PAPER 2: INK 7: C 15
1100 PRINT AT 4,0:*****MENU*****
1200 PRINT AT 6,2:"Key A to Alter Item"
1300 PRINT AT 6,2:"Key B to Add Item"
1400 PRINT AT 6,2:"Key C to Delete Item"
1500 PRINT AT 6,2:"Key E to Enter Stock on List"
1600 PRINT AT 6,2:"Key L for Print Stock Levels"
1700 PRINT AT 6,2:"Key R for Print List"
1800 PRINT AT 6,2:"Key S to Save Stock List"
1900 PRINT AT 6,2:"*****"
2000 PRINT AT 21,0: INPUT "Input Selection":A$
2100 CLS
2200 IF A$="A" THEN GO TO 3000
2300 IF A$="B" THEN GO TO 4000
2400 IF A$="C" THEN GO TO 5000
2500 IF A$="E" THEN GO TO 6000
2600 IF A$="L" THEN GO TO 7000
2700 IF A$="R" THEN GO TO 8000
2800 IF A$="S" THEN GO TO 9000
2900 IF A$=" " THEN GO TO 1000
3000 RT 0: CLS
3100 PRINT AT 21,0: Input code n
3200 IF n=0 THEN: INPUT B
3300 PRINT AT 21,0:

```

```

3400 LET C$="1. PRINT AT 0,0:"ST
3500 TAB 3:"Stock Item"
3600 TAB 10:"TAB 10:"ST
3700 TAB 20:"TAB 20:"ST
3800 TAB 30:"TAB 30:"ST
3900 FOR Z=1 TO A: IF Z=1 THEN 1
4000 C$="1. PRINT AT 21,0:Z:TAB 0:Z:
4100 TAB 10:"TAB 10:"Z:
4200 TAB 20:"TAB 20:"Z:
4300 NEXT Z
4400 INPUT B: LET W(B)=W(B)+1
4500 PRINT AT 0,0:B:TAB 0:B:
4600 FOR NEXT Z: IF B=1 THEN 1
4700 IF INKEY$=" " THEN GO TO 10
4800 IF INKEY$=" " THEN DEEP 2
4900 PRINT AT 21,0: INK 6: Key B
5000 FOR NEXT Z: IF B=1 THEN 1
5100 GO TO 2000
5200 GO TO 2010
5300 PRINT AT 0,0:"ST:"TAB 3:"C
5400 TAB 10:"TAB 10:"ST:"TAB 20:"C
5500 TAB 30:"TAB 30:"ST:"TAB 20:"C
5600 TAB 40:"TAB 40:"ST:"TAB 20:"C
5700 TAB 50:"TAB 50:"ST:"TAB 20:"C
5800 TAB 60:"TAB 60:"ST:"TAB 20:"C
5900 TAB 70:"TAB 70:"ST:"TAB 20:"C
6000 TAB 80:"TAB 80:"ST:"TAB 20:"C
6100 TAB 90:"TAB 90:"ST:"TAB 20:"C
6200 TAB 100:"TAB 100:"ST:"TAB 20:"C
6300 TAB 110:"TAB 110:"ST:"TAB 20:"C
6400 TAB 120:"TAB 120:"ST:"TAB 20:"C
6500 TAB 130:"TAB 130:"ST:"TAB 20:"C
6600 TAB 140:"TAB 140:"ST:"TAB 20:"C
6700 TAB 150:"TAB 150:"ST:"TAB 20:"C
6800 TAB 160:"TAB 160:"ST:"TAB 20:"C
6900 TAB 170:"TAB 170:"ST:"TAB 20:"C
7000 TAB 180:"TAB 180:"ST:"TAB 20:"C
7100 TAB 190:"TAB 190:"ST:"TAB 20:"C
7200 TAB 200:"TAB 200:"ST:"TAB 20:"C
7300 TAB 210:"TAB 210:"ST:"TAB 20:"C
7400 TAB 220:"TAB 220:"ST:"TAB 20:"C
7500 TAB 230:"TAB 230:"ST:"TAB 20:"C
7600 TAB 240:"TAB 240:"ST:"TAB 20:"C
7700 TAB 250:"TAB 250:"ST:"TAB 20:"C
7800 TAB 260:"TAB 260:"ST:"TAB 20:"C
7900 TAB 270:"TAB 270:"ST:"TAB 20:"C
8000 TAB 280:"TAB 280:"ST:"TAB 20:"C
8100 TAB 290:"TAB 290:"ST:"TAB 20:"C
8200 TAB 300:"TAB 300:"ST:"TAB 20:"C
8300 TAB 310:"TAB 310:"ST:"TAB 20:"C
8400 TAB 320:"TAB 320:"ST:"TAB 20:"C
8500 TAB 330:"TAB 330:"ST:"TAB 20:"C
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8700 TAB 350:"TAB 350:"ST:"TAB 20:"C
8800 TAB 360:"TAB 360:"ST:"TAB 20:"C
8900 TAB 370:"TAB 370:"ST:"TAB 20:"C
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9100 TAB 390:"TAB 390:"ST:"TAB 20:"C
9200 TAB 400:"TAB 400:"ST:"TAB 20:"C
9300 TAB 410:"TAB 410:"ST:"TAB 20:"C
9400 TAB 420:"TAB 420:"ST:"TAB 20:"C
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9600 TAB 440:"TAB 440:"ST:"TAB 20:"C
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9800 TAB 460:"TAB 460:"ST:"TAB 20:"C
9900 TAB 470:"TAB 470:"ST:"TAB 20:"C
1000 TAB 480:"TAB 480:"ST:"TAB 20:"C
1010 TAB 490:"TAB 490:"ST:"TAB 20:"C
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1080 TAB 560:"TAB 560:"ST:"TAB 20:"C
1090 TAB 570:"TAB 570:"ST:"TAB 20:"C
1100 TAB 580:"TAB 580:"ST:"TAB 20:"C
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4230 TAB 3710:"TAB 3710:"ST:"TAB 20:"C
4240 TAB 3720:"TAB 3720:"ST:"TAB 20:"C
4250 TAB 3730:"TAB 3730:"ST:"TAB 20:"C
4260 TAB 3740:"TAB 3740:"ST:"TAB 20:"C
4270 TAB 3750:"TAB 3750:"ST:"TAB 20:"C
4280 TAB 3760:"TAB 3760:"ST:"TAB 20:"C
4290 TAB 3770:"TAB 3770:"ST:"TAB 20:"C
4300 TAB 3780:"TAB 3780:"ST:"TAB 20:"C
4310 TAB 3790:"TAB 3790:"ST:"TAB 20:"C
4320 TAB 3800:"TAB 3800:"ST:"TAB 20:"C
4330 TAB 3810:"TAB 3810:"ST:"TAB 20:"C
4340 TAB 3820:"TAB 3820:"ST:"TAB 20:"C
4350 TAB 3830:"TAB 3830:"ST:"TAB 20:"C
4360 TAB 3840:"TAB 3840:"ST:"TAB 20:"C
4370 TAB 3850:"TAB 3850:"ST:"TAB 20:"C
4380 TAB 3860:"TAB 3860:"ST:"TAB 20:"C
4390 TAB 3870:"TAB 3870:"ST:"TAB 20:"C
4400 TAB 3880:"TAB 3880:"ST:"TAB 20:"C
4410 TAB 3890:"TAB 3890:"ST:"TAB 20:"C
4420 TAB 3900:"TAB 3900:"ST:"TAB 20:"C
4430 TAB 3910:"TAB 3910:"ST:"TAB 20:"C
4440 TAB 3920:"TAB 3920:"ST:"TAB 20:"C
4450 TAB 3930:"TAB 3930:"ST:"TAB 20:"C
4460 TAB 3940:"TAB 3940:"ST:"TAB 20:"C
4470 TAB 3950:"TAB 3950:"ST:"TAB 20:"C
4480 TAB 3960:"TAB 3960:"ST:"TAB 20:"C
4490 TAB 3970:"TAB 3970:"ST:"TAB
```

# Sound & vision

This program was written for the BBC micro, model A or B, and plays the musical game of Simon. The object of the game is to repeat the ever-increasing sequence of lights and tones by using the four cursor keys which correspond to the computer's coloured squares.

If you manage to reach your inputted skill level the computer will reward you with a warbling sound. Any mistakes and the game will end.

The program consists mainly of two For-next loops. The Y loop (line 200) controls the point in the sequence that you have successfully repeated. The X loop is used twice (line 210 and line 290) and runs from the beginning of the sequence to Y, controlling which light and tone is to be



## Simon says . . .

*L Raynor presents Simon, a musical game for the BBC model A or B.*

made. The pattern of the lights in the sequence is stored in the A array which is dimensioned (line 170) to store as many lights as the skill level you had previously entered.

The lighting up effect is made by changing the appropriate colour, determined by the number (1-4) in the array, to white and then back to its original colour, by the use of the Vdu 19 command (lines 230,260,390 and 420). The Fx 4,2 command enables the cursor keys to be detected by an Inkey statement and the Fx 15,0 command clears the sound buffer.

One useful procedure is the Procwait() one, which pauses for T milliseconds. I managed to reach a score of 14 — can anyone beat that?

```

10 REM*** SIMON BY L.M. RAYNER *
20 REM**  FOR B/C MICRO MODEL A OR B **
30 MODE 7
40 FOR X=1 TO 2:PRINTCHR$(141)CHR$(129)"; SIMON":NEXT X
50 PRINT""
60 PRINT CHR$(13)"; REPEAT MY SEQUENCE OF SOUNDS AND"
70 PRINTCHR$(13)";"COLCURS BY USING THE FOUR CURSOR KEYS"
80 PRINTCHR$(134)";"WHICH CORRESPOND TO MY FOUR SQUARES."
90 INPUT" SKILL? (10-30) "Z
100 IF Z<10 OR Z>30 THEN 90
110 *FX 4,2
120 MODE 5
130 FOR X=0 TO 3:VDU 19,X,0,1,0,0,0:NEXT X
140 GCOL0,1:MOVE 640,512:MOVE 0,512:PLOT85,640,1,24:PLOT 85,0,1024
150 GCOL0,2:MOVE 640,512:MOVE 640,1024:PLOT 85,1280,512:PLOT 85,1280,
1024
160 GCOL0,3:MOVE 640,512:MOVE 640,0:PLOT 85,1280,512:PLOT 85,1280,0
170 DIM A(Z)
180 FOR X=1 TO Z:A(X)=RND(4)-1: 30:GOTO 510
NEXT
190 PROCWAIT(100)
200 FOR Y=1 TO Z
210 FOR X=1 TO Y
220 SOUND 1,-15,A(X)*20,30
230 VDU 19,A(X),7,0,0,0
240 PROCWAIT(50)
250 *FX 15,0
260 VDU 19,A(X),A(X)+1,0,0,0
270 PROCWAIT(50)
280 NEXT X
290 FOR X=1 TO Y
300 A$=GET$
310 A=9
320 IF A$=CHR$(139) THEN A=0
330 IF A$=CHR$(136) THEN A=1
340 IF A$=CHR$(137) THEN A=2
350 IF A$=CHR$(138) THEN A=3
360 IF A=9 THEN 30
370 IF A(X)>A THEN SOUND 1,-15,1,570 ENDPROC
380 SOUND 1,-5,A(X)*20,30
390 VDU 19,A(X),7,0,0,0
400 PROCWAIT(50)
410 *FX 15,0
420 VDU 19,A(X),A(X)+1,0,0,0
430 PROCWAIT(50)
440 NEXT X
450 PROCWAIT(120)
460 NEXT Y
470 FOR R=1 TO 20
480 SOUND 1,-15,150,2
490 SOUND 1,-15,40,2
500 NEXT R
510 COLOUR 2:PRINT TAB(5,10)
"SCORE=";Y-1
520 PRINT""PRESS SPACE TO START"
530 A$=GET$:RIN
540 DEFPROCWAIT(T)
550 TIME=0
560 REPEAT UNTIL TIME=T
570
```



# Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

## ABOMINABLE CURSORS

K V Jefferies of East Walk, Croydon Road, Reigate, writes:

**Q** After using my ZX81 for seven months I am having difficulty in switching from 'K' cursor to 'F' cursor. With the Shift key depressed, pressure on New line does not immediately produce the Function cursor. Is there any simple solution?

I was thinking of buying a Kempston keyboard. Will this solve the problem, or will it be a waste of money, if the touch sensitive system is faulty?

**A** I have a big sticker on my ZX81. 'New line won. Roll the finger over the key to make contact.' As your machine is within the guarantee period, in theory you should send it back. If you do, test it as soon as Sinclair return it to you. If there is no improvement send it back on the same day, with a stiff covering letter.

Some people who have had experience of the Sinclair returns department would advise you very strongly against doing this if you want to see your machine back in anything like a reasonable time.

There is not a lot of evidence of ZX81 keyboards giving out, so this case should be seen in isolation. If the keyboard is at fault, then another keyboard should bypass the problem.

The only exception would be if one of the diodes had become damaged in some way, preventing it from discharging power at the right time. This is however very unlikely.

## EACH ONE TO HIS TASTE

Michael Andrews of South East London, writes:

**Q** I have just been given a Texas Instruments 994 computer for a birthday present. Could you please tell me if there are any books or maga-

zines published for this computer, or if there is a user's club? It seems that it is not a very popular computer and does not have much support.

**A** I do not know about horses, but perhaps you are looking a gift computer a little in the mouth. Think of all those BBC and Sinclair customers who have been waiting literally months for computers that still have not been delivered. While the TI 994 might not be well supported, it is not without admirers. It has a home users group who should be able to give you the sort of information you need. Write to Paul Dicks, TIHOME, 157 Bedford Road, Morden, Surrey.

## COMMANDING PROBLEMS

Stephen Clements of Hophurst Drive, Crawley Down, West Sussex, writes:

**Q** I am writing to ask if you could help me out with a problem I have been agonising over for the past few weeks. I have been converting programs for the ZX81 to be used on my Vic, but I have come face to face with a line *Print at x,y*; which I do not know how to convert. Can you help me?

**A** One of the major disadvantages of the ZX81 is that it does not have a memory mapped screen. Therefore you cannot Poke characters on to the display, though you can use the *Print at x,y*; command. *Print at x,y*; "+" would mean that at line x, column y, the character + would appear.

But the ZX81 can *Print at* more screen locations than the Vic20 can Poke. This is because the ZX81 uses a 22 line x 32 column grid, whereas the Vic uses a 24 line x 22 column grid.

The control of characters will have to be different, because a location defined by a *Print at* command is not mapped into a specific place in the memory. Such a location will float in the Ram, without a permanent address that can be *Peeked* or *Poked*.

Horizontal locations are determined by adding or subtracting from y, while vertical locations are determined by adding or subtracting from x. A simple routine to show this would be:

```
10 LET X=10
20 LET Y=10
30 PRINT AT X,Y; "+"
40 IF NOT INKEY$="" THEN PRINT
   AT X,Y; "a space"
50 IF INKEY$=" " THEN LET
   Y=Y+1
60 IF INKEY$="v" THEN LET
   X=X+1
70 IF INKEY$="t" THEN LET
   X=X-1
80 IF INKEY$="b" THEN LET
   Y=Y-1
90 GOTO 30
```

## PACKAGING MEMORIES

M Ellick of Burington Close, Bristol, writes:

**Q** I have a ZX81 with a 64K Ram Pack fitted. In a letter in your July 1 issue, you mention that the ZX Microdrive will probably be able to be used with other computers, like the ZX printer. Do you think that an adaptor will be needed to use the Microdrive with the ZX81?

**A** Until someone actually sees the Microdrive we cannot be sure how easy it will be to use with the ZX81. However, the ZX81 does not have the disc control commands in its Rom, so some sort of extra control will be necessary. My guess is that this will take the form of an Epprom accessible by Poke commands. This means that you will have to switch out another block of your memory pack to make way for the Epprom. But, this would still allow you to write a 48K program, with a database stored on the Microdrive.

## SWITCHING BLACK AND WHITE

Imtiaz Mirza of Priory Avenue, High Wycombe, Buckinghamshire, writes:

**Q** I read in PCW July 8 that it was not possible to modify the ZX81 hardware to change the black characters on a white background to white

characters on a black background. You said that this was only possible on the ZX80. Could you please advise me on how to do this?

**A** The modification on the ZX80 to give inverse video is a simple wiring job. On the underside of the pcb are three letters A, B and C. Normally, the track runs from A to C. A simple wire bridge between A and B, instead of A and C, will do the job. If you want to get really clever, you could always wire in a switch, so that you could change between an ordinary and inverse display.

D Fritsch, of 6 Stanton Road, Felwell, Warrington, Cheshire WA4 2HS, makes an add on that will give you an inverse display on the ZX81.

## HOODWINKING KEYWORD MEMORY

Alan Haggood of Fulham, London, writes:

**Q** I know that if I want to use a keyword on my Vic20, I can enter it by using the first letter, followed by the second letter shifted. What I would like to know is why this is so?

**A** This useful feature on the Vic is due to the operating system which uses text compression. All the keywords on a Vic are stored as a number between 0 and 255. If you write *Input* on to the screen, it will be stored there as five bytes, and will therefore take up five bytes of screen memory. But it will leave the buffer as a single byte with a decimal value of 132. Whatever the number of bytes of screen memory the keyword takes, it will still only be stored as a single byte.

When you use an I shift N for *Input* you are fooling the computer into thinking that you have entered the full command. This only uses two bytes of screen memory. If you *List* the instruction, it will come up as *Input*, because the process is reversed as information comes back to the screen out of the buffer.

# Classified

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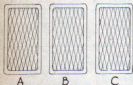
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# Competitions

## Finding the lady



Three playing cards are placed face down on a table. The total value of A and B is 15. The total value of B and C is 17. No card is a seven or has a value higher than 9. Identify the cards.

This problem can be solved using a simple program:

```
10 FOR A = 1 TO 9
20 LET B = 15 - A
30 LET C = 17 - B
40 IF A = 7 OR A > 9 OR B = 7 OR B > 9 OR C = 7
   OR C > 9 THEN GOTO 60
50 PRINT "A=";A;"B=";B;"C=";C
60 NEXT A
```

Even without a computer this is not a difficult problem, but the same approach will apply to more complex problems.

Now try this card trick. Deal 20 cards off a shuffled pack and ask a friend to insert the cards back into the pack, but the other way up from the rest of the pack (face up rather than face down). Shuffle the pack and get your friend to count off the top 20 cards, straightening the pile so that you cannot see which way they face. Ask

your friend to note, without telling you, the number of cards face-up in the remaining 32 cards.

Hold the 20 cards behind your back and — by thought transference — you will be able to turn individual cards over so that the number of cards face-up in your part of the pack is the same as the number face-up in your friend's 32 cards.

When the two piles of cards are investigated, they will be found to have the same number of cards face-up.

How is it done? When you hold the cards behind your back you simply turn them over.

The whole pack contains 52 cards, of which 20 have been turned over. If your friend has a number of cards,  $p$ , turned over in his pile of 32 cards then you have  $20 - p$  reversed cards in yours. Since there are 20 cards in all in your pile then you must have  $p$  cards face down. Turn the whole pile over and you have the same number of cards face-up as your friend.

## Puzzle No 21

Take a pack of cards and perform a perfect 'riffle' shuffle. In such a perfect shuffle the pack is divided exactly in half. Each half is then held at one end while the other ends are flicked together so that the cards become perfectly interleaved.

Repeat the shuffle a number of times. Each time ensure that the first card to fall is from the top half of the pack that was formerly on the top of the pack — thus making sure that the top and bottom cards are always changing. Continue

shuffling until the pack is brought back to its order at the start.

How many times must the shuffle be performed if (a) a standard deck of 52 cards is used and (b) if the jokers are added to make a pack of 54 cards?

### Solution to Puzzle No 17

First find the length of the sides of a non right-angle triangle where the area is 180 sq miles and the sides are exact numbers of miles in length. This can be done using a program similar to the one below.

```
10 LET L = 10
20 FOR A = L - 9 TO L
30 FOR B = 2 TO A - 1
40 FOR C = (A - B) + 1 TO B - 1
50 LET S = (A + B + C) / 2
60 LET T = SQR(S * (S - A) * (S - B) * (S - C))
70 IF ABS(T - 180) < 0.000001 AND B + B + C =
   C <> A THEN GOTO 200
80 NEXT C
90 NEXT B
100 NEXT A
110 LET L = L + 10
120 GOTO 20
200 PRINT A;" ";B;" ";C
210 STOP
```

This gives the sides as 37, 30 and 13 miles. The catch was in the words 'the morning's total divided by half' — meaning multiplied by two. In this case the distance from A to B could only be 13 miles — covered in the morning — with 26 miles covered in the afternoon. With a total round trip of 80 miles, this leaves 41 miles still to be travelled to finish the journey.

### Winner of Puzzle No 17

The winner is P M Hill, Westcott Close, Frome, Somerset who receives £10.

## ARTHUR MEETS A FOREIGNER, CALLED ALAN OG

# ARTHUR

Laurence Lerner & James Macdonald  
PUBLISHED BY THE COLLECTION PEOPLE, 14, LAIT STREET,  
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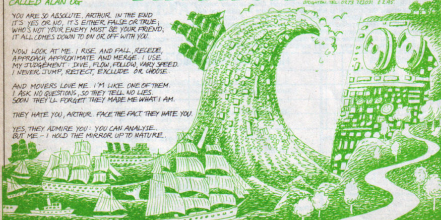
YOU ARE SO ABSOLUTE, ARTHUR. IN THE END  
IT'S YES OR NO, IT'S EITHER FALSE OR TRUE,  
WHO'S NOT YOUR ENEMY MUST BE YOUR FRIEND,  
IT ALL COMES DOWN TO ON OR OFF WITH YOU.

NOW LOOK AT ME. I RISE, AND FALL, RESIDE,  
APPROACH APPROXIMATE AND MERGE. I USE  
MY JUDGEMENT. DIVE, FLOW, FOLLOW, VARY SPEED.  
I NEVER JUMP, RESTRICT, ENCLOSURE OR CHOOSE.

AND MOVERS LOVE ME. I'M LIKE ONE OF THEM.  
I ASK NO QUESTIONS, SO THEY TELL NO LIES.  
SOON THEY'LL FORGET THEY MADE ME WHAT I AM.

THEY HATE YOU, ARTHUR. FACE THE FACT THEY HATE YOU.

YES, THEY ADMIRE YOU. YOU CAN ANALYSE.  
BUT ME - I HOLD THE MIRROR UP TO NATURE.



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Leading computer Designers Richard Atwasser and Steven Vickers have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

## All inclusive Price

For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

Even if you are a complete newcomer to computers, the manual will guide you step by step from first principles to confident programming.

The price includes postage packing and V.A.T.

## Technical Specification

### Hardware

#### Processor/Memory

Z80A running at 3.25 MHz.  
8K bytes ROM 3K bytes RAM.

#### Input

40 moving-key keyboard with auto-repeat on every key.

#### Output

Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36.

#### Sound

Provided by internal loudspeaker.

#### Cassette

Load Save & Verify at 1500 baud, separate data storage.

### Software, FORTH

#### Data Structures

Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types.

#### Control Structures

IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

#### Operators

Mathematical +, -, X, /, Logical AND, OR, NOT, XOR, Comparison <, >, =.

#### Program Editing

FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

## Order Form

The Jupiter Ace is available only by mail order. Please allow up to 28 days for delivery.

Send cheque or postal order with the form to—

JUPITER CANTAB, 22 FOXHOLLOW, BAR HILL, CAMBRIDGE CB3 9EP

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